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SOME INDIVIDUAL PLANT BIOMASS VALUES FROM NORTHEASTERN MINNESOTA

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ABSTRACT.--As part of a study describing vegetation biomass dynamics following wildfire in standing virgin forest communities, mean dry weight per individual for immature and mature tree, shrub, and herbaceous species for the 1971 through 1975 growing seasons in northeastern Minnesota are presented.

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A recent search of the literature revealed that, except for mature tree species, there is a striking lack of published data on biomass of individual plants (Ohmann and Grigal, in preparation). This note provides mean biomass for individuals of some immature and mature tree, shrub, and herbaceous species.[1] The data were collected during a study of the post-fire vegetation biomass changes following the Little Sioux Wildfire of 1971 in northeastern Minnesota.

The aboveground crop of vegetation was harvested during August of each of the first 5 years following the fire. All vegetation in 10 randomly located plots (each 0.605 m^2) within each of seven post-fire plant communities was clipped at ground level. Thus, a total of 70 plots or 42 m^2 was sampled each year. Each plot was marked following clipping to ensure that it would not be clipped again in succeeding years.

All vegetation from the clipped plots was sorted by species in the laboratory. The number of individuals of each species on a plot was recorded, and the samples for a plot were bagged, dried at 70 C to constant weight, and weighed by species to the nearest 0.01 gram.

The total weight of each species from all seven communities was divided by the total number of individuals of that species in the sample to derive the mean dry weights (table 1).

Year-to-year variability in mean individual dry weights can be ascribed to growth (particularily of the woody species), the presence of many smaller individuals resulting from germination of the previous year's seed crop (Aster macrophyllus, for example), disease infestation (Venturia shoot blight on Populus grandidentata in 1973, for example), variation in annual precipitation available for growth (the precipitation from August 1972 through July 1973 was lower than that for the other growing seasons and lower than the 30-year average for the area), sampling variation, and experimental error.

[1]*We thank Ms. Devvie Cercine for help in sample collection and processing.*

Table 1.--*Average individual dry weights and numbers of individuals sampled at the end of the 1971 through 1975 growing seasons on the Little Sioux Wildfire Area of northeastern Minnesota*

Species	Post-fire growing season									
	1971		1972		1973		1974		1975	
	gms	no	gms	no	gms	no	gms	no	gms	no
Trees										
Acer rubrum	1.93	46	6.51	37	16.64	48	28.82	34	48.37	46
Betula papyrifera	6.04	5	2.18	89	6.82	19	37.78	23	108.37	33
Picea mariana	---	--	.01	2	.08	5	---	--	10.20	1
Pinus banksiana	.01	240	.12	204	1.30	213	3.81	213	13.96	209
Pinus strobus	---	--	---	--	---	--	---	--	98.95	3
Populus grandidentata	19.99	24	59.84	39	53.74	21	112.05	23	255.19	40
Populus tremuloides	4.51	277	27.49	153	52.67	125	51.88	86	192.71	64
Quercus rubra	---	--	6.75	2	.18	1	111.96	3	---	--
Sorbus americana	---	--	.04	3	---	--	11.10	4	88.27	2
Shrubs										
Acer spicatum	1.86	15	4.37	9	---	--	---	--	---	--
Alnus crispa	---	--	---	--	---	--	---	--	263.86	3
Amelanchier spp.	1.48	16	.58	4	4.59	44	17.12	63	37.91	17
Chimaphila umbellata	.07	15	---	--	.33	57	.29	30	.46	7
Comptonia peregrina	.35	238	5.37	146	4.62	322	14.10	111	17.90	159
Corylus cornuta	3.09	59	7.69	98	13.46	189	13.62	90	31.56	92
Diervilla lonicera	.18	51	.32	55	1.82	86	4.24	4	3.80	27
Gaultheria procumbens	.05	291	.10	563	.10	792	.14	1,208	.14	503
Lonicera canadensis	.68	34	3.05	13	1.69	65	5.00	69	2.86	91
Prunus pumila	---	--	1.39	18	---	--	---	--	---	--
Prunus pensylvanica	.36	236	3.04	158	4.98	171	7.50	147	20.95	118
Ribes glandulosa	---	--	---	--	.05	1	4.94	1	---	--
Ribes triste	---	--	---	--	.19	1	.06	7	---	--
Rosa acicularis	---	--	2.72	12	.74	12	4.23	1	4.50	7
Rubus pubescens	.16	3	.47	59	.68	22	.27	49	.29	2
Rubus strigosus	.82	215	1.72	193	.88	449	1.56	312	1.54	256
Salix spp.	1.88	29	24.33	6	---	--	60.75	1	66.55	6
Vaccinium angustifolium	.16	330	.59	822	.65	620	.79	482	.84	152
Vaccinium myrtilloides	.16	140	.75	29	.70	64	1.43	84	1.60	151
Herbaceous plants										
Anemone quinquefolia	.01	3	.01	8	.06	10	.06	6	---	--
Apocynum androsaemifolium	.58	1	2.34	4	---	--	---	--	---	--
Aralia hispida	.04	90	.90	264	1.55	290	2.06	121	2.63	54
Aralia nudicaulis	.24	271	.61	260	.68	272	1.00	170	1.23	129
Aster macrophyllus	1.48	790	.77	3,113	.69	1,305	.71	1,040	1.04	656
Clintonia borealis	.17	171	.38	250	.41	303	1.06	255	.62	195
Coptis groenlandica	.01	10	.01	12	---	--	.01	357	.03	12
Cornus canadensis	.13	867	.20	2,192	.14	2,563	.13	3,606	.18	2,781
Corydalis sempervirens	.20	62	---	--	---	--	---	--	---	--
Epilobium angustifolium	.80	3	2.71	6	.20	133	.76	14	2.25	12
Fragaria vesca	.09	6	---	--	.11	3	.15	53	.19	51
Galium triflorum	.13	10	.01	26	---	--	---	--	.16	4
Geranium bicknellii	.84	161	.32	41	.05	213	---	--	.82	1
Goodyera repens	---	--	---	--	.01	1	---	--	---	--
Gramineae	.02	372	.29	687	.72	530	.18	718	.12	1,003
Lathyrus ochroleucus	.03	14	---	--	---	--	---	--	---	--
Linnaea borealis	.08	65	.13	112	.24	261	.47	187	1.01	107
Lycopodium clavatum	---	--	.02	3	---	--	---	--	---	--
Lycopodium complanatum	.18	13	.17	23	.75	39	.36	40	.49	29
Lycopodium obscurum	.24	49	.22	57	.40	142	.44	55	.74	182
Maianthemum canadense	.01	1,434	.04	1,588	.05	1,793	.05	2,233	.06	1,158
Melampyrum lineare	---	--	.05	13	.14	9	.08	8	.20	44
Polygonum cilinode	1.24	106	3.03	175	.79	324	.26	112	.13	58
Pteridium aquilinum	3.99	149	3.90	230	6.11	187	7.00	87	8.12	93
Pyrola spp.	.04	17	.23	13	.08	83	.06	21	.05	56
Streptopus roseus	.05	7	.15	64	.26	5	.14	16	.28	5
Trientalis borealis	.05	31	.10	33	.10	18	.08	34	.16	12
Viola spp.	.02	17	.01	17	.01	5,794	---	--	---	--
Vicia americana	---	--	---	--	---	--	---	--	1.19	1
Polytrichum spp.	0.01	137	.01	3,069	.01	2,194	.01	1,826	.01	4,736

In our analysis of the revegetation dynamics of the seven burned communities (Ohmann and Grigal, in preparation), we found that the low shrub and herb strata had stabilized in terms of dry weight per unit area by 1974. On that basis, we assume that most low shrub and herb weights presented for 1974 and 1975 represent weights that can be found in mature forest communities. The trees and tall shrubs were still increasing in biomass in 1975, and so the values presented can generally be considered to represent immature individuals.

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